



Ø BEAT



COLORADO SPRINGS,
COLORADO

SEPTEMBER 1986

PIKES PEAK RADIO AMATEUR ASSOCIATION, INC
P.O. Box 16521
COLORADO SPRINGS, CO 80935

FIRST CLASS MAIL



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The Pikes Peak Radio Amateur Association meets on the second Wednesday of each month at Giuseppe's Depot Restaurant at 10 S. Sierra Madre at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Phil Somers VE1ARC, 1075 Allegheny Dr. Colorado Springs, CO 80919 590-7136

EDITORIAL NOTES

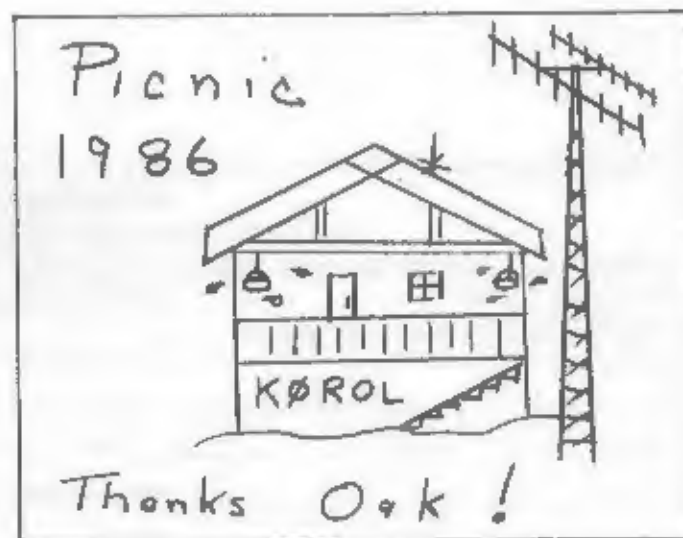
Last month, I managed a short reprimand from writing "Editorial Notes" by getting the President to say a few words. I have not been so successful this month, but I'm hoping for the Vice-President next time. I'll bet the club officials would appreciate your support for "their" monthly participation. Why not mention it to them at the September meeting?

You will notice we have a new advertiser this month and a format change on several of the regulars. They all advertise in hope that we support their products. So when you do, why not take an extra moment to point out you are an radio amateur and that you saw their ad in Ø-Beat. We ran a free ad for Giuseppe's last month to thank them for their support to our monthly meetings. The more of us that go out to the meetings a bit early and have dinner and/or refreshments, the happier they will be, and the more likely our nice arrangement will continue.

Now that the busy summer is over, I am hoping many of you prospective article writers will put pen to paper and create that article you have been thinking about. To the regulars, thanks for your continued support. To all, I am happy to get any article, even hand-written. But I am overjoyed to get articles over a phone modem or via packet radio. If you have a few moments to type it up on your computer and get it to me electronically, it sure saves me a lot of time at my slow typing speed.

Chris, WBØDHU has gotten a nice regular column going on antennas. He is asking for questions and comments on his column so he can make it better. So if you have always wondered about some aspect of antennas, pose him a question. Or let me know, and I'll get the word to Chris for his next article.

"LOCAL QRM"



SEPTEMBER MEETING

The next regularly scheduled meeting of the Pikes Peak Radio Amateur Association will be held on Wednesday, September 10 at 7:30 PM at Giuseppe's Depot at #10 S. Sierra St. The tentative program will feature a talk on amplifiers by Lauren - KXØØ.

HOW TO CHOOSE A TNC
Lyle Johnson, WA7BXD
(Packet Radio Magazine May 86)

Step one in deciding which TNC is for you is deciding what you want to do on packet. Today, the most prevalent form of packet operation is ASCII text at 1200 baud AFSK on a 2 meter FM rig. 300 baud HF operation is rapidly gaining in popularity, especially on 40 and 20 meters.

Before the year is out, operation on JAS-1 and RUDAK [satellites] should be fairly commonplace. While RUDEK will probably be oriented toward gateway-style access, you may be able to access JAS-1 from your home station on an individual basis.

GLB PK-1 and PK-1L.

Overview: These units are software-intensive, requiring the microprocessor (uP) to do all input and output (I/O) for the terminal and the radio channels on a bit to bit basis. They come fully assembled and tested. GLB has been marketing the PK-1 since 1983. Price class is \$110. to \$160.

Strengths: Units operate at 12 vdc. PK-1L draws under 25 mA. Baudot adaptor available for interfacing to older RTTY gear.

Weaknesses: If a character is typed at the keyboard when a packet is being sent or received, the packet is trashed. No built-in watchdog for unattended (eg. digipeater) operation, although one is available as an accessory. No indicators (eg. LEDs) to tell what the unit, or channel, is doing. 2400 baud maximum on HDLC (radio) port. No modem disconnect or easy means of attaching a better modem for satellite or high-speed operation. RS-232 interface switches between GND and plus 12 volts only. Callsign must be burned into EPROM at time of ordering or manually entered every time the unit is powered up.

AEA PK-64.

Overview: A dedicated accessory for a Commodore 64 computer (or c-128 in c-64 emulation mode). Menu-driven interface. Operates all digital modes (CW, RTTY,

ASCII, AMTOR, Packet). Fully assembled and tested. Price class \$220. HF modem option \$100.

Strengths: Easy to interface to C-64. All software built-in for split-screen operation. First all-mode digital controller. Hardware HDLC port may allow future operation at higher speeds.

Weaknesses: Dedicated terminal interface may limit usefulness for non-text communications. Unit is only usable with Commodore 64 or 128 computers. 40 character display width limit.

TNC-1, Heath HD-4040, AEA PKT-1.

Overview: These units are based on the TAPR TNC kit, first marketed in 1983. Heath unit is a kit, comes with status indicator, is AC powered and sells for \$200. AEA version has a +12 vdc power supply, is fully assembled and sells in the \$500 range.

Strengths: Standard modem disconnect for satellite and higher-speed operation. Software selectable baud rates for terminal and radio ports. Parallel port for expansion/status/testing. Two banks of non-volatile user storage of callsign, timing and other parameters. Standard command interface. True RS-232 interface levels. All ports full duplex. Tuning indicator connector for HF use (compatible with TAPR tuning indicator). Watchdog timer on radio port for compliance with regulations for unattended operation. On-board modem configurable via plug-in headers.

Weaknesses: Support for AX.25 V 2.0 and multiple connects only available from third-party source (uses non-standard command interface). Physically larger than other units. 6551 UART in terminal interface has a bug with hardware flow control.

Kantronics Packet Communicator.

Overview: A compact unit that features an AMD7910 modem, comes fully assembled and costs about \$220. THE KPC was first marketed in 1985, and the successor version, KPC-2, appeared in 1986.

Strengths: Uses standard command set. Operates on +12 v power. True RS-232

interface levels. Modem tones software selectable for 300 baud HF as well as 1200 baud VHF use. TTL interface selectable for Commodore computers. AX.25 V 2.0 supported. Multiple connects supported. Non-volatile memory stores callsign and other parameters.

Weaknesses: Software HDLC port limits data rates for future use. No modem disconnect. HF modem uses different tone pair than most others, resulting in a different frequency display. Modem does not lend itself to tuning indicator for HF. No watchdog timer for unattended digipeating or other operation.

TAPR TNC 2, AEA PK-80, Pac-Comm TNC-200, GLB TNC-2A, MFJ-1270.

Overview: The TNC 2 was designed to reduce the cost of entry into packet without sacrificing performance or features. It has been marketed since 1985. All versions are compact in size. AEA version is assembled for \$220. GLB offers a kit for \$155 (NMQB) or \$170 (CMQB). MFJ unit is assembled for \$129. Pac-Comm offers bare boards (\$39), kits (\$130-\$170) as well as assembled (\$200-\$220).

Strengths: Hardware HDLC supports 9600 baud rates on radio port. Standard modem disconnect. On-board modem configurable via plug-in headers. CMOS versions draw 100 mA. All units run on +12 volts. True RS-232 interface levels. (MFJ unit also has TTL for Commodore computers). LED indicators provide status of unit and packet channel. Watchdog timer for compliance with unattended operation. Software available for true network switching. AX.25 V 2.0 supported. Multiple connects supported. Standard user interface. Extensive documentation in fully-indexed manuals. Large non-volatile memory stores operating parameters and callsign. Modem connector interfaces to TAPR HF tuning indicator.

Weaknesses: Radio and serial port data rates set by DIP switch. Some early units generated hash on HF.

IBM PC Cards

The Hamilton, Ontario packet group has a card that plugs into the IBM PC. It supports V1, V2 and AX.25 protocols. It is based on the Intel 8273 HDLC chip,

includes an on-board XR2206/2211 modem and sells for \$75 bare board or \$200 assembled.

AMRAD has developed a plug-in card using an 8530 SCC. It contains two channels of HDLC, a pair of 7910 modems, and will be available from PacComm in the summer.

Other TNCs.

GLB showed the PK-2 at Dayton. This is based on the 280 and 8530 chips, features the TAPR as well as GLB command sets, a plug-in modem based on the 7910, and can control their new 9600 baud radio directly. It sells assembled for \$249 and should be available this summer.

Packeters makes the IPT, a terminal with integral packet controller. The packet controller is based on the TNC 1 design but uses a 7910 modem. The unit runs on +12 vdc and sells for \$1000.

Lockhart Technologies makes the TNC+ kit, a unit based on the earlier VADCB TNC of the late 1970s. It sells in the \$200. price range. It includes no on-board modem or cabinet.

AEA announced their new PK-232 TNCs at Dayton, with availability projected during the summer. These are multi-mode units, offering CW, ASCII, RTTY, and AMTOR in addition to packet operation. One version includes an internal modem, while the other is for use with external modems only. Pricing information is not yet available.

Ashby and Son sells a version of the original VADCB TNC. It is smaller, includes no modem, and sells assembled (but without cabinet) for about \$250.

Three final notes for the HF operator. At Dayton, TAPR released an HF tuning indicator kit. It works with all TNC 1 and TNC 2 clones, and most other TNCs that utilize the XR2206/XR2211 modem chip set. It is only \$25.

Amateur Packet Alaska sells a switch and PC board kit that installs in any TNC 1 or TNC 2. It provides a front panel switch to select HF or VHF modem operation. It sells for \$30.

If you use an XR2211 PLL demodulator in your modem, and you want to use it on HF, note the resistor between XR2211 pins 11 and 12 should be 180k and the resistor between pins 7 and 8 should be 750k. The capacitor from pin 8 to ground should be 0.01 uF.

(This article is an excerpt from the May 1986 issue of Packet Radio Magazine, the Florida Packet Club newsletter. It was somewhat condensed from the original.)

COLORADO GRID HOPPERS submitted by Jim, WA9ABB

On August 2, 1986, Jim Sorrells, WA9ABB, Al Vrooman, N0CMW, and Charles Belleville, ex-W09DWJ, went on a grid DX-expedition to DM 77, 87, and 88. One of the better locations was a high spot in DM 87 several miles north of La Junta, Colorado. Al was the front seat Chief Operator. Charles provided the antenna support and rotation. Jim did the driving.

Contacts from all three grids were completed on 220 MHz, 446 MHz, and 1296 MHz with Ron Deutsch, NK0P, in Colorado Springs. Performance on 1296 MHz was surprisingly good on SSB using an ICOM 1271A 10 watt multimode rig and a 12 foot loop yagi on loan from Lauren Libbey, KX00.

Portable VHF-UHF grid hopping is both challenging and fun. If you are interested in trying it, contact one of the above-mentioned grid hoppers.

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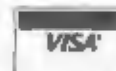


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HAM BBS IN TOWN

The Hip Shack is a new Amateur Radio phone Bulletin Board Service in Colorado Springs. It is operated by Bdale Garbee, N3EUA who recently moved to the Springs. The BBS is A FIDO board, with node number 156/B, a subnet of a California Fido system. The main purpose of the board is to support DARPA Internet Protocols (IP/TCP/UDP). HIP stands for Hams running IP. To the uninitiated, this seems to mean that Bdale is keenly dedicated to experimenting with advanced packet-like protocols. He is looking for hams with packet equipment and IBM PC type computers to share in these experiments.

Other parts of the Hip BBS contain message sections supporting amateur radio, amateur satellites, and an excellent section on Shortwave Listening. If you would like to use the BBS, give it a call at 593-0766.

WHAT

Boulder's Autumn Event

BARCFEST86

Amateur Radio, Computer & Electronics Swapfest
aka Flea Market, Hamfest, Good Fun

WHEN

First Sunday in Autumn

September 21, 1986

8 AM to 2 PM

WHERE

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(look for white smoke stacks)

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HOW

Donation \$3.00 per person (except children)

-> door prize ticket

-> sharable table space while it lasts

(bring own table, if you can)

Additional prize tickets \$1.00 or 6 for \$5.00

WOW

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YAESU FT 727R dual band handi

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Information from Price Roberts, KB0TS

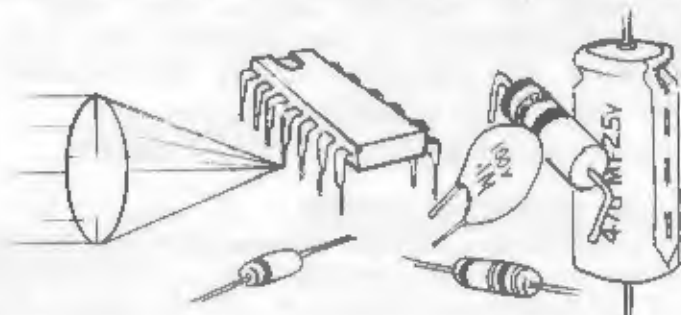
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NEW SURPLUS STORE

The above advertisement is from a new surplus store in Colorado Springs. You can see that they carry a line of products of interest to radio amateurs. Several club members have already spent several hours "browsing" through the mountains of surplus items looking for that special deal. Bob, WA0YPL will help you find things if he can recall where he put them.

Dick and Bob are very willing to do their best to serve the ham community. If you don't see what you want, put it on their list and they will try to find it on their buying trips.

If we help this new company get started here in Colorado Springs, I'm sure we will be re-paid with a great "junk" store, with a big turnover and low prices. Notice the nice discount they will give with their ad. Saturday morning after breakfast is a good time to look over the store. They are located very close to the flea market at the dog track. Check it out !!!

16 AUGUST 1986 VE TEST #5
submitted by Pete, NOLA

Congratulations to all the recent upgrades.

Name	Call	Before Test	After Test
Philip Bergeson	W0MXY	Advanced	Extra
Lawrence Roehr	KA0PAD	General	Advanced
Charles Phillips	KA0DXV	Novice	General
Elsie Swain	KA0WIN	Tech	General
Vicke Winter	KA3VHI	Novice	Tech
William Kahler	none	none	Tech
Evan Barrett	KA0WBB	Novice	Tech
Andre Clair	KA0YLU	Novice	Tech
David Shropshire	KA6UNP	Novice	Tech
Rene Tetra	none	none	Tech
Kit Haskins	KA0WUC	Novice	Tech
John Mitterer	KA0YLD	Novice	Tech
Ryan Jensen	none	none	Novice
Ernest Burchell	none	none	Novice

TEST	1A	1B	1C	2	3	4A	4B
GIVEN	5	5	1	4	11	1	1
PASSED	4	2	1	4	8	1	1
% PASSED	80	40	100	100	73	100	100
TOTAL TESTS GIVEN	28						
TOTAL TESTS PASSED	21						
% PASSED	75						

UPGRADES N2, TB, B2, A1, E1
TOTAL 14 TOTAL ATTENDED 18
% UPGRADES 78

The next tests will be November 15, 1986.

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FUJI SATELLITE LAUNCHED

The JAS-1 satellite, now called "Fuji", has reached its planned circular orbit. The time of "birth" was 21 hours, 47 minutes 07 seconds UTC on August 12.

The following are the Fuji operating frequencies:

Mode JA uplink: 145.900 to 146.000 MHz

Mode JA downlink: 435.900 to 435.800 MHz.

(Inverting transponder)

Operating frequencies for Mode JA, the Mode J analog mode for SSB and CW, may be determined as follows. The sum of the uplink and downlink frequencies equals 581.800 MHz exclusive of Doppler shift. For

example, if the uplink is 145.920 MHz, the downlink will be 435.880 MHz. Conversely, if the downlink is to be 435.810 MHz, the uplink should be set your uplink for 145.990 MHz. In both these examples, the sum of the uplink and downlink equals 581.800 MHz.

The beacon is now operational on 435.795 MHz, sending 20 WPM CW telemetry.

Mode JD, the digital Mode J, will be activated in several weeks. The Mode J Analog Transponder is now available for use. Amateurs are requested to use the minimum power necessary.

August 15, 1986

The ARRL Letter

AO-10 ALIVE

Recovery efforts aimed at restoring AMSAT OSCAR 10 to service met success July 15th when the Mode B transponder was enabled for limited use. This favorable development capped two months of intensive work by spacecraft engineers and controllers. It marked the culmination of a process of subtle diagnostic testing, rewriting the IHU (Integrated Housekeeping Unit) software and cautious evaluation of the results.

AO-10's computer memory had been showing evidence of accumulating radiation damage for nearly a year. The error correcting software hit counter had been incrementing regularly. Last autumn the first major hard failure became evident. But the software was able to accommodate it. On May 17th, the quantity and location of errors in the IHU memory overwhelmed the error correction mechanism and caused the operating system to crash. This took AO-10 off the air in what most users considered an unexpected shock.

At the time the situation looked bleak; controllers were able only to reset the IHU with the master reset command.

Karl Meinzer, DJ4ZC, designed a memory diagnostic package which produced a memory map of the failed and marginal memory cells. The memory map proved to be a veritable road map to AO-10 recovery. Based on this chart of the affected memory areas, Karl was able to rewrite the IPS operating system so as to avoid the affected zones. Ian Ashley, ZL1AOX, working with Karl, soon reported the new IPS package seemed to be working. The IHU wasn't crashing as it had been.

By about July 12, the decision had been made to turn on Mode B beginning July 15th.

August 4, 1986

The ARRL Letter

AO-10 RETURNS TO SERVICE

After two months off the air because of a serious computer malfunction, AMSAT OSCAR 10 has been returned to service. After two weeks on line, transponder use has returned to near normal levels.

With the return of transponder operations, let's review good operating practice. Users should carefully control their uplink power to assure their downlink is comparable to the beacon. In fact, being told that one's signal is very strong, could likely be construed as an insult by a seasoned AO-10 operator! As a general guide, AMSAT advises that if you can't hear the beacon well, you need to work on your receive system. And if you can't hear the beacon at all, you need to QRT until you make needed repairs!

The overall satellite condition is stable and, for all external appearances, things have returned to normal. However, ZL1AOX and DJ4ZC continue to work behind the scenes to maintain the radiation damaged IHU (Integrated Housekeeping Unit) memory. No one familiar with the circumstances believes we have seen the last of the problems which crashed the IHU on May 17th. Rather, most hope AO-10's useful life can be extended until Phase 3C is on station in mid 1987. To accomplish this end, controllers continue to juggle available memory resources in the face of a dynamic situation in the IHU.

Users can aid this effort by observing recommended power levels to avoid unduly draining the batteries.

August 15, 1986

3 The ARRL Letter

Antennas
By Chris Smith
WB0DHU

The common dipole - every ham from Novice to Extra knows what the dipole antenna is, and most have several. It is thought to be synonymous with a narrow band antenna. It is not unusual for 40 meter band dipoles to be cut for some subsegment of the band, such as the Novice band or the phone band. On 80 meters, cutting a dipole for a particular frequency is the rule. Yet dipole antennas can be broadband antennas. A single dipole can be constructed to cover 160 to 10 meters with a VSWR of 2:1 or better.

Recently, I have seen articles on constructing cage dipoles for the whole 80 meter band. This is remarkable because antennas using cage structures were all the rage in the days of spark gap transmitters. The idea is sound - the cage structure makes the dipole fat - that is, its effective radius may be on the order of one meter (1/80th of a wavelength) instead of one milli-meter (1/8000th of a wavelength). Fat structures tend to make broadband antennas.

The real key to broadbanded antennas, though, is not related so much to element "fatness" as it is to the idea of "self-similar structures." A self-similar structure is one that can be (in concept) scaled by any arbitrary factor and be unchanged. This is a unusual and theoretical concept, but an example may help.

Consider a circular cone, such as a pointed ice-cream cone. Now imagine that it is infinitely long, so that the ice-cream cone is just the last few inches of a mind-bogglingly huge cone. What would it look like if it suddenly doubled in size? Actually, it wouldn't look different at all, and that is the key to self-similarity.

Self-similar structures have an amazing property - they look the same at any scale size. They have the same property when "seen" by a radio wave. They always look to be the same size. Remember that "size" for radio waves is measured in wavelengths. So if a given self-similar structure were to look (for instance) like a half-wave dipole for an 80 meter wave, it would look like a half-wave dipole for

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a 2 meter wave. This is the key to broadbanded antennas.

Antennas can't be infinitely large, of course, but they can be a finite portion of a self-similar structure. That means a real antenna can't radiate efficiently over an infinite bandwidth, "D.C. to daylight," but they can work over an arbitrarily-large bandwidth limited only by the space available and the materials at hand.

I hope to continue this idea in future columns to explain how you could make a dipole that would cover all the bands you might be interested in. Proof abounds that it can be done - the TCI catalog lists at least 3 dipoles that cover the commercial HF frequencies of from 2 to 30 MHz.

If any of this has caught your imagination, please take a few minutes to write down a comment or question and send it to the editor of Q-Beat, or to me. I'll try to get a response in the next column.

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NEW NOVICE AT DEAF AND BLIND SCHOOL submitted by Jim, WA9ABB

Frank Royball, age 17, became the first student in the radio amateur class at the Colorado School for the Deaf and Blind to successfully pass the Novice class amateur radio theory and Morse code examination on July 29, 1986. Weekly classes, which started in September 1985, were sponsored by the Pikes Peak Radio Amateur Association (PPRAA). Instruction was provided by Jim Sorrells (WA9ABB), an Extra-class amateur radio operator and board member of the PPRAA. Class size varied between 6 to 12 boys, ranging 9 to 18 years of age. Progress was slow but steady during the school year with the students' other activities and school classes taking precedence.

During summer vacation, Frank was able to concentrate his efforts. Since Frank lived in Colorado Springs, Jim continued to tutor him weekly. Frank learned Morse code with little difficulty, but because of his visual impairment, radio theory was not quite as easy. Frank's next goal is to upgrade to either general or technician amateur radio class license.

Amateur radio classes at the Deaf and Blind School will continue this fall. Hopefully, several other boys will be able to get their amateur radio licenses. A club station for the boys is another goal in the works. If you would like to help with the class, contact Jim Sorrells at 598-7543.

WATCHDOG TIMERS

"I have had a receiver sitting on 14.103 for over an hour tonight copying solid continuous 'fill' characters from some poor packeteer who has his keying line stuck down. This has also been observed on several occasions on our local Balto/Wash 2-meter LAN frequencies. In addition to being very hard on your radio (few radios are designed for continuous commercial service and tend to get quite warm after a few minutes of such service, and after an hour tend to develop a lot of 'krispy kritters' inside!) this is also very illegal.

"I would advise all packeteers to check to make certain your watchdog timer is functioning. TNC 2 owners should make certain that JMP4 is NOT installed.

"I offer even a stronger concern for users of Kantronics KPC TNCs which apparently do not have any fail-safe watchdog timer included. I would advise all KPC users to build a watchdog and install it ASAP. Operating without a watchdog timer is like playing Russian Roulette."

From W3IWI

Gateway: The ARRL
Packet Radio Newsletter

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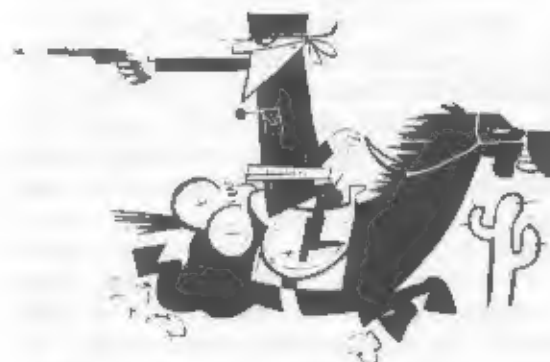
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? If you have any information, please ?

? contact Lee, W80BLV at 390-4444. ?

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??

Don KEOBJ (ex WDOHWS) held his monthly raffle producing the following winners:

GOOD DEAL - FOR SALE

A number of Gel Cells with chargers:
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Chris - WBOGDU - 495-0624

WACIX	George	Chimney antenna mount
WB7THT	Rick	FCC Rule Book
NOLA	Pete	Digital watch
NOCMW	Al	10 Watts to 1000 Book
KOROL	Oak	\$10. Centennial
NOLA/XYL	Ann	2 mike connectors
KAOROI	Jody	Weekend Projects Book
NODDF	Bud	Floppy Disk
VEIARC	Phil	\$10. Walkers
KAOROI	Renay	Understanding Am. Rad.

CHRISTMAS PARTY - 12 DECEMBER 1986

submitted by Rick Kile, WB7THT

Christmas is almost upon us (only 122 days) and it is time to start thinking about the club Christmas dinner. This year, it will be Friday, 12 December at the Iron Springs Chateau in Manitou Springs. Dinner will be served "family style" from 6 to 8 PM, and features chicken, barbecued ribs, home-style mashed potatoes, green beans, salad, biscuits, gravy, and coffee and tea. After dinner, a comedy, pirate melodrama entitled "Yo Ho Ho and a Barrel of Fun" will be presented. Cost for this evening of fun is \$16.00 per person. See me at the Saturday breakfast meetings or call me at home (599-7665) for information and reservations. Come on out and help make this a Christmas dinner to remember.

CLUB PICNIC AT OAK'S CABIN

submitted by Al, NOCMW, secretary

The annual picnic took the place of the general meeting for August. The picnic was held at Oak's KOROL mountain cabin on Sunday August 10, 1986. The picnic was attended by approximately 26 members, guests, and children. Everyone had a nice time. The picnic got moved indoors by a sudden but short wind storm at approximately 14:30 local time. Those of you who did not attend missed a grand time. There was lots of great food for all. Oak and his son were most gracious hosts, ensuring that the annual picnic was again a memorable occasion. Thank you Oak.

MINUTES OF THE AUGUST BOARD MEETING

submitted by Al, NOCMW, secretary

The board meeting was held at the home of Al NOCMW on August 11, 1986. Those in attendance were Al NOCMW, Les KCONC, Don KEOBJ, Bud NODDF, Phil VEIARC and Oak KOROL via packet radio from his cabin.

It was decided that next year the monthly meeting would not be skipped for the picnic. Phil mentioned a contest for club newsletters, and he was directed to enter ours. It was decided that the secretary write a letter to the special clubs manager for some info on the library donation, and to send a list of those on the awards committee to get the info on that committee.

Rick WB7THT volunteered to head up the Christmas Party committee this year. He was authorized to go ahead and get some info on the options. The club has a location to hold novice classes and a lot of prospective novices, but we need volunteers for cw and theory instruction.

Elections of officers will be coming up in October. Don announced the HT would be given away at the September meeting. Repeater committee is still looking into a portable repeater to be used for special events. Lauren KX00 will present a program on amplifiers at the September meeting. It was decided that a jacket, hat and badge would be given away at the September meeting for the best of the newsletter articles submitted during the past 3 months.

There being no further business the meeting was adjourned at 2100 hours. The next meeting of the board will be at the home of Don KEOBJ, on Monday September 15, 1986 at 1900 hours.

MILEY'S RADIO

Jess KØTAA 719 W. 7th St. Florence, Colorado 81226 784-3040
Hours 8 to 6 Tuesday through Friday — Saturdays 8 to 12 — Evening Hours 7:30 to 10 (Call Ahead)
Closed Saturday PM, Sunday & Monday

Due to the price increases on new equipment and numerous hamfests with fast turnover of used equipment, we will not run our usual list this month.

MILEY'S HAMFEST SCHEDULE FOR 1986-1987

SEPTEMBER 1986

Sept. 17-22 Wichita Falls, TX
Sept. 25-29 Santa Fe, NM

OCTOBER 1986

Oct. 10-13 Lubbock, TX
Oct. 30-Nov. 4 Odessa, TX

FEBRUARY 1987

1st Weekend Littlefield, TX

MARCH 1987

3rd Weekend Midland, TX

APRIL 1987

2nd Weekend Mooreland, OK
3rd Weekend Albuquerque, NM
4th Weekend Bean Feed-Las Cruces, NM

MAY 1987

1st Weekend Sierra Vista, AZ
Closed April 23-May 5, 1987
2nd Weekend Grand Junction, CO (tentative)
3rd Weekend Colorado Springs, CO

JUNE 1987

1st Weekend Loveland, CO

JULY 1987

2nd Weekend Douglas, WY
3rd Weekend East Glacier, MT
Closed July 9-July 27, 1987
4th Weekend Woodland Park (tentative)

AUGUST 1987

2nd Weekend Amarillo, TX
3rd Weekend San Angelo, TX
5th Weekend Alamogordo, NM

SEPTEMBER 1987

1st Weekend Laramie, WY
3rd Weekend Wichita Falls, TX
4th Weekend Santa Fe, NM

OCTOBER 1987

2nd Weekend Lubbock, TX

NOVEMBER 1987

1st Weekend Odessa, TX

Ham clubs wishing us to come to their Hamfest, please pick a date other than those listed. We'll have our normal equipment list next month. Many thanks for your continued support, and have a wonderful Fall!!

Membership Application

PIKES PEAK RADIO AMATEUR ASSOCIATION, INC.

P.O. Box 16521
Colorado Springs, CO 80935

Name _____

Address _____

City _____ State _____ Zip _____

Call _____ License Class _____

Are You An ARRL Member? ☐ Yes ☐ No Telephone _____

☐ Full Member \$12.00 ☐ Family Membership \$15.00 ☐ Newsletter Only \$4.00

Additional Names _____ Call _____ Class _____

Associate Member \$8.00 ☐ (Outside Teller & El Paso Counties.)